**Introduction**

Our project is analyzing ionic molecules by Capillary Electrophoresis (CE), separating and identifying them by the biochip system. Biochip aims at miniaturizing and integrating functionalities of a biological or biochemical test into a chip. This is effective in separating mixtures when only small amounts of sample are available.

**Objectives**

- To learn the micro-fabrication techniques of the biochips.
- To understand the principle of capillary electrophoresis.
- To learn the principle of conductivity detection.
- Construct PDMS biochips for molecules separation and detection.

**Methodology**

**Knowledge Needed for Project Execution**

- **Capillary Electrophoresis (CE)**
  - Electro-osmotic Flow – Motion of liquid induced by applied potential
  - Electrophoretic Mobility – Motion of particles under the influence of uniform field

- **Biochip Fabrication**
  - Polydimethylsiloxane (PDMS) – Clear polymer for fabricated biochip
  - Fabrication of Silicon Wafer

- **Detection Method**
  - Fluorescence Detection
  - Contactless Conductivity Detection

**Result**

By switching the high voltage at different time, a plug of the analyte will be squeezed out and move along the separating channel. As the plug moves along the channel, the band gap between two plugs will increase due to capillary electrophoresis. Then we can perform the detection part.

For the experiment, we used the Agilent 4294A Precision Impedance Analyzer as a tool to measure the changes in the separation channel. As the result shown in figure 9, the impedance of four different analyte can be measured. The order of analyte impedance matched with the calculated result.